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John A Adam*, Department of Mathematics & Statistics, Old Dominion University, Norfolk, VA 23529. *“Waves” of healing, the critical size defect and keloid scars: some speculation.*

Two related models are presented for wound healing on a spherical surface. By interpreting the healing process as a “pseudowave” propagating across the spherical surface a heuristic account of the “speed” of healing is possible, and a corresponding upper bound on the healing time is characterized. Of particular importance in relation to animal models is the existence (or not) of a critical size defect (a CSD, defined below); this is discussed as a consequence of the stability of the steady states of the system to non-uniform spatial (or angular) perturbations. Explicit criteria are derived under which a CSD exists (within the model) in terms of the skull radius and wound radius. The second model invokes a weighted spatial average cell density which permits the presence of both a short-range activation term (as in the first model) and a long-range inhibition term. Under these circumstances, within a suitable parameter range, the phenomenon of aggregation may occur in addition to the behavior predicted by the first model. It is speculated that such aggregation is manifested in the case of keloid scarring, which can occur as a result of wound healing in tissue. (Received August 10, 2010)